

TELESCOPE 565

by BUSHNELL

How to set up your Telescope

The only tool required in setting up your telescope is a slotted or phillips blade screwdriver. Since your telescope is a precision optical system it makes sense to handle the various parts with care...particularly the telescope, eyepieces, and various accessory lenses included. It's a good idea to lay all the parts out in front of you before assembling.

Step 1...The Tripod

The tripod has three leg units...each with 2 outer legs and a center leg that slides in and out. Each leg unit is held together with a metal band that wraps around it and has a threaded hole with a thumb screw. Take a leg unit and loosen the thumb screw. Pull the center leg out about 12 inches and tighten the thumb screw so the leg won't slide. For a moment don't extend the leg fully...a shorter leg is less awkward to work with. Repeat this process with each leg unit.

Now take a long bolt and 2 large washers and install it through the holes at the top of the legs so that a washer is positioned on both outer sides of the leg. Attach a wing nut to the bolt but do not tighten it all the way yet. Repeat with each leg unit.

Step 2...Putting the Mount on the Legs

Look at the bottom of the mount. It has three...“FEET” Each with a vertical slot in it...The tripod legs will be installed to each of these feet.

Slide a leg unit onto a foot of the mount, oriented so the slotted metal accessory bracket on the leg faces the inside. When fitting the long leg bolt, make sure that the leg unit slides up to the top of the vertical slot. Tighten long leg bolt using the supplied wing nuts.

Step 3...Attaching the Accessory Tray/Tripod Brace

Lift the mount and stand the assembled unit on all three legs. Now install the triangular accessory tray. The tray also provides extra stability and prevents the legs from collapsing. Attach a flat corner of the tray to a slotted metal bracket that lifts up from the tripod leg unit. Make sure the tray sits on top of the bracket. Fasten the tray to the bracket with a short bolt, 2 small washers, and a wing nut. The brackets are slotted so you can make adjustments. Once the tray is fully mounted, tighten all the wing nuts. The mount and tripod should now stand securely.

Step 4...Attaching the Equatorial Mount

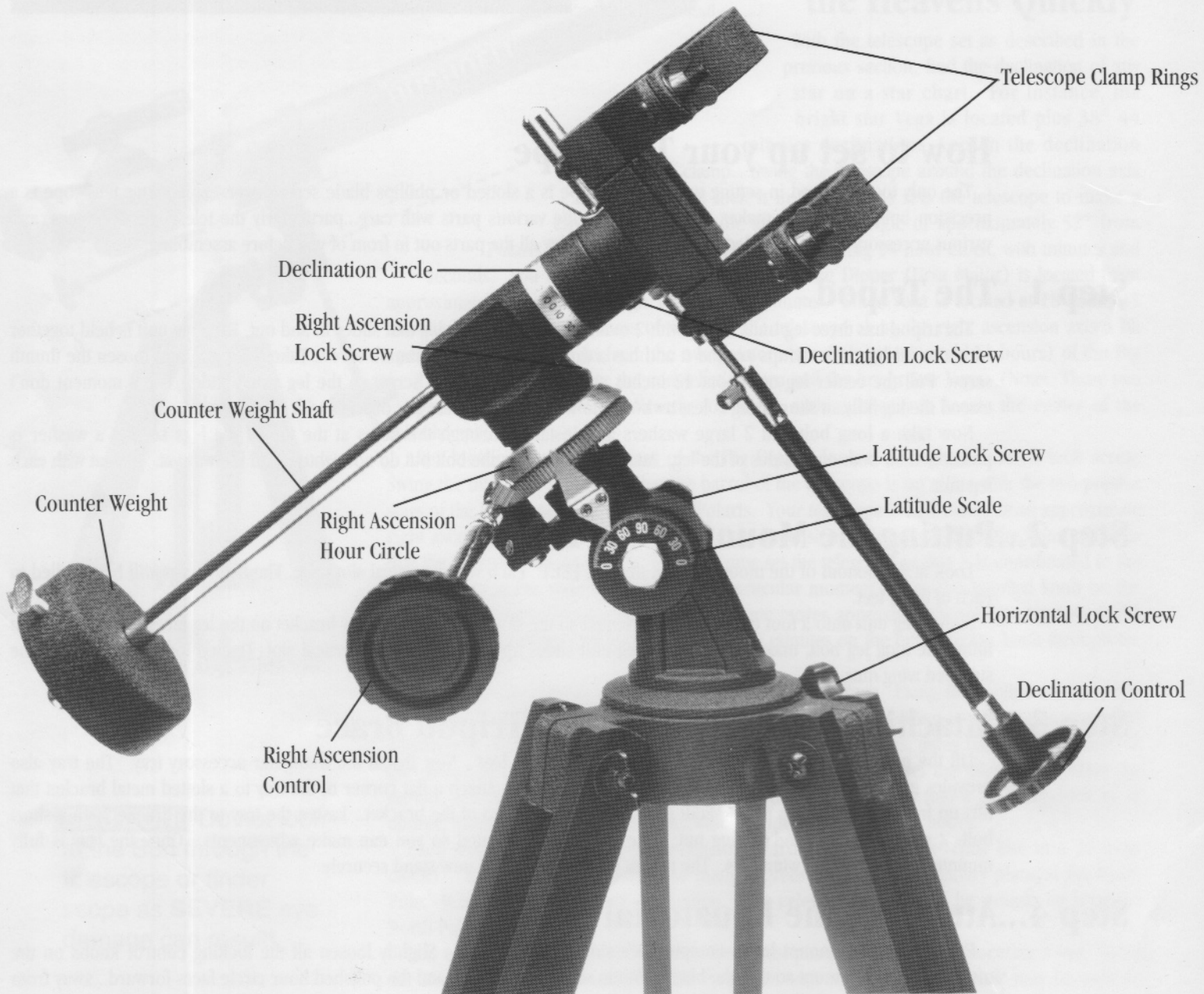
Even though the mount looks complex, it's simple to assemble. Slightly loosen all the locking control knobs on the mount. Move the mount so that the black latitude scale is on the left and the polished hour circle faces forward...away from you. Now tighten the locking control knobs so the mount stays in position.

Next take one of the black flexible control cables and attach it to one of the silver posts of the “Worm Gear” just under the hour circle, both left and right hand positions are provided. Finger tighten the set screw on the shaft. This shaft controls the Right Ascension Axis.

Open the telescope clamp rings to the right. With the finder scope on top, lay the telescope in the bottom rings. Close the clamp rings and secure them loosely with the remaining bolts, washers, and wing nuts.

Slide the counter weight onto the counter weight shaft and tighten the thumb screw to hold the weight in position for now. Thread the shaft into the hole on the bottom of the declination column of the mount. Make sure it is tight.

BUSHNELL MODEL 565



Step 5...Balancing the Telescope

- A. Loosen the R.A. (right ascension) lock knob. With R.A. lock loosened, the telescope mount will turn freely about the polar axis. Rotate the telescope about the polar axis so that the counterweight shaft is parallel to the ground (horizontal).
- B. Loosen the counterweight's lock screw, and slide the counterweight along the shaft until the telescope remains in any given position without tending to drift in either rotational direction about the polar axis. Then re-tighten the counterweight lock screw, locking the counterweight in position.
- C. To balance the telescope about the declination axis. First loosen the declination lock knob, then slightly loosen the clamp ring screws so that the telescope main tube can slide inside the rings. Slide the main tube up or down inside the rings until the telescope is balanced about the declination axis. Re-tighten the clamp ring screws. The telescope is now balanced.

Step 6...Finder Scope and Accessories

The 5x24 finder scope fits into a plastic ring, and three lock screws on the finder scope bracket hold it firmly in place. To adjust the finder scope loosen the set screws and slide the finder forward or back to the most comfortable position for you. Adjust the set screws to align the finder scope image (of a distant object) with the image seen through the telescope. Tighten the lock screws firmly.

At the end of the focusing tube of the telescope you will see a tube with a small set screw, by loosening this screw you can add the star diagonal and accessory lenses. Insert the polished tube of the star diagonal into the focusing tube and rotate it to a comfortable viewing position, then tighten the lock screw to secure it in position. Eyepieces simply slide into the top of the star diagonal.

To install the erecting lens remove the star diagonal and install the erecting lens. Insert an eyepiece and tighten the holding lock screw. That's all there is to it!

Understanding the Equatorial Mount

The equatorial mount is designed to move in any direction. It can be set to allow the manual controls to track the movements of celestial bodies across the sky. This is referred to as diurnal movement; movement of celestial bodies in the direction opposite to that of the earth's rotation and is around the earth's axis or celestial axis (fig. 1).

By aligning the telescope polar axis at celestial North, you will place the telescope in parallel with the earth's axis and thus be able to locate stars in the sky based on information in star charts and star atlases.

In simple language you aim your telescope dead center in the celestial sphere...that point in the sky that is like the hub of a wheel and does not appear to move. The angle of declination is simply 90° minus the angle away from this hub. Celestial North is $+90^\circ$. If you were at the North Pole, you would point your telescope straight up to aim at celestial North.

To compensate for your position on the round earth, the polar axis is set in one of three simple ways (see fig. 2).

- 1) Set up the telescope at night. Loosen the declination axis lock screw and turn the telescope around to the north until the arrow points at 90° on the declination scale. Tighten the declination axis clamp screw. The telescope is now roughly in parallel with the parallel axis.
- 2) Loosen the horizontal lock screw and turn the telescope until the objective end faces due North. This can be done by an approximate sighting on the pole Star (Polaris) or by the use of a compass to find magnetic north. True North is then found by directing the telescope at the Pole Star, as magnetic North is slightly away from true North.

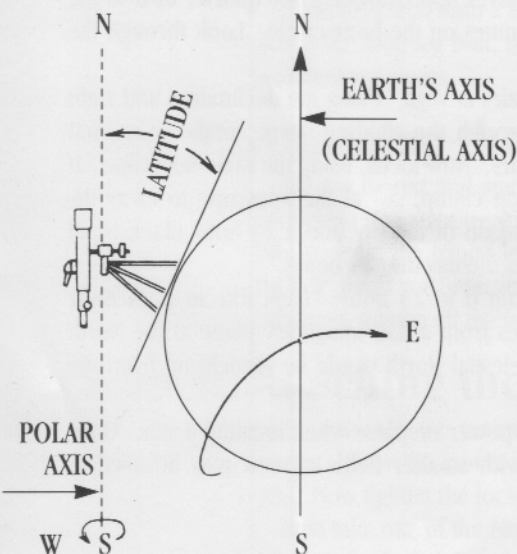


Fig. 1

POLAR AXIS AND EARTH'S AXIS

- 3) Look up the latitude of your area in any geographical atlas. Loosen the latitude lock screw and set the latitude scale to the correct latitude for your area. Aim the Finder Scope at the Pole Star. You will probably notice that Polaris (the Polar Star) is not dead center in the crosshairs sighting scope. This is probably because your telescope is not absolutely level with the ground. Loosen the horizontal axis lock screw again and turn the telescope so that it is directly aimed at the Pole Star. Clamp both lock screws tight. Polaris is 1° off the North celestial pole. Therefore, the sighting of stars will have to be slightly adjusted as you locate them in the heavens.

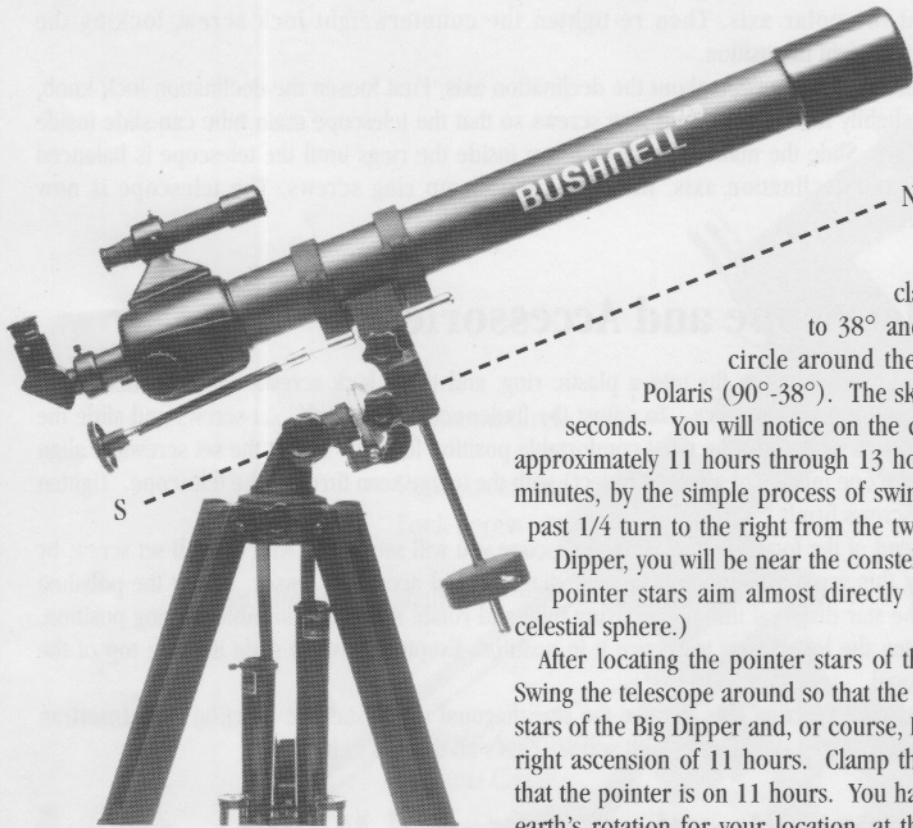


Fig. 2
POLAR AXIS ADJUSTMENTS

CAUTION: Do not look at the Sun through the telescope or finder scope as **SEVERE** eye damage can result!

To Locate any Star in the Heavens Quickly

With the telescope set as described in the previous section, find the declination of any star on a star chart. For instance, the bright star Vega is located plus $38^\circ 44$ minutes declination. Loosen the declination clamp. Swing the telescope around the declination axis to 38° and lock it in there. This sets the telescope to make a circle around the pole star with an angle of approximately 52° from Polaris ($90^\circ - 38^\circ$). The sky is divided like a big 24 hour clock, with minutes and seconds. You will notice on the chart that the Big Dipper (Ursa Major) is located from approximately 11 hours through 13 hours 45 minutes. Since Vega is located at 18 hours 35 minutes, by the simple process of swinging the telescope along the right ascension axis a bit past $1/4$ turn to the right from the two pointer stars (at approximately 11 hours) of the Big Dipper, you will be near the constellation Lyra and the bright Star Vega. (Note: These two pointer stars aim almost directly at Polaris, making it easy to locate the center of the celestial sphere.)

After locating the pointer stars of the Big Dipper, loosen the right ascension lock screw. Swing the telescope around so that the barrel of the telescope is on a line with the two pointer stars of the Big Dipper and, of course, Polaris. Your telescope is now aimed at an approximate right ascension of 11 hours. Clamp the right ascension lock screw. Turn the hour circle so that the pointer is on 11 hours. You have now set the telescope so that it is coordinated to the earth's rotation for your location, at this particular moment. Turn the knurled knob on the right ascension attachment so that the telescope moves approximately one quarter turn to the right, until the pointer is a bit past 18 hour 30 minutes on the hour circle. Look through the sighting scope.

The bright star close to the center of the crosshairs is Vega. Using the declination and right ascension flexible cable controls as you look through the sighting scope, make your final adjustments so that Vega is centered in the crosshairs. Now focus, using the main telescope. If the mount hits against itself, loosen the declination clamp, swivel the telescope to clear the mount, and reset the declination pointer. The division of the sky into a 24 hour clock is, of course, based on the earth's rotation...which divides the day into 24 hours.

Each star is located at a right ascension of from 0 to 24 hours--(just like in a 24 hour clock). Each star is also located so many degrees from a flat, imaginary plane at the North Pole. It is called the angle of declination. Due celestial North would be straight up from the North Pole, or 90° .

It is essential to always start out with the lowest power eyepiece when locating a star. Once the star is found, the more powerful eyepieces with smaller fields of view may be used to greater advantage.

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#90-0434